

3.2 HYDROLOGY, FLOODPLAINS, AND WATER QUALITY

This section summarizes the surface water, groundwater and floodplains studies contained in the DEIR/DEIS, August 2001, and the *Floodplain Evaluation Report and Floodplain Evaluation Report Reduced Build Alternative Addendum* (December 2000).

3.2.1 SURFACE WATER

The primary surface water resources within the study area include the Santa Ana River, San Gabriel River and Santiago Creek (see Figure 3.2-1).

A. LOCATION

The study area lies within the jurisdiction of the Santa Ana Regional Water Quality Control Board (RWQCB). The Santa Ana River is the region's largest river, flowing southwest from the San Bernardino Mountains into the Pacific Ocean at Huntington Beach (USGS, 1999). The major tributary to the Santa Ana River within the project area is Santiago Creek. The creek empties into the Santa Ana River approximately 490 meters (1,600 feet) downstream from the Bristol Street Bridge south of SR-22.

The San Gabriel River is located at the western boundary of the project area. Runoff in the study area near the San Gabriel River and I-605 is discharged into the Los Alamitos Channel. Currently, the Los Alamitos Channel does contain wetlands in various locations in the project vicinity. For more information on the locations of the wetlands, refer to Section 3.4. Since runoff from the project area does not discharge directly into the San Gabriel River, no further discussion of the San Gabriel River will be provided in this section.

Other surface water features located within the study area include 16 lined and unlined flood control channels. These channels do not have any beneficial uses as defined by the Santa Ana Basin Water Quality Control Plan (1995). For further information regarding flood control channels within the study area, refer to Section 3.2.3 of this document.

B. BENEFICIAL USES

Santa Ana River. Reach 2 of the Santa Ana River, located within the study area, provides several beneficial uses. The existing beneficial uses in this segment include agriculture, groundwater recharge, and water contact and non-contact recreation. Reach 2 also provides habitats for warm freshwater ecosystems, wildlife, and rare, threatened or endangered species. Currently, this segment of the river is accepted for municipal and domestic uses.

Santiago Creek. Reach 1 of the Santiago Creek is also located within the study area. Although the creek is not as large as the Santa Ana River, Santiago Creek has similar beneficial uses. Beneficial uses of the creek's waters within the project limits include municipal and domestic supply, groundwater recharge and water contact and non-contact recreation. There are also potential wildlife and warm freshwater habitats within this reach of the creek (Santa Ana RWQCB, 1995).

C. QUALITY

The SR-22/West Orange County Connection (SR-22/WOCC) study area is densely urbanized and consequently has a high proportion of impervious surfaces. The Santa Ana River, Santiago Creek and other channels within the study area receive runoff from the high amount of paved area in the region. Water was not sampled within the study area (Hintlian, 2000); however, the surface water is generally considered to be of poor to fair quality.

Currently, none of the major water resources within the study area are included in the California 303(d) List and TMDL (Total Maximum Daily Load) Priority Schedule. However, the Bolsa Chica Channel and the East Garden Grove-Wintersburg Channel discharge directly into Huntington Harbor, which discharges into Anaheim Bay. Both Huntington Harbor and Anaheim Bay are 303(d)-listed waterbodies. Huntington Harbor is listed for metals, pathogens and pesticides, and Anaheim Bay is listed for metals and pesticides. In addition, The Los Alamitos Channel also discharges into a 303(d)-listed waterbody. The San Gabriel River receives discharges from the channel and is listed for abnormal fish histology, algae, ammonia, high coliform count and toxicity. No TMDL's have been established for any of these water bodies.

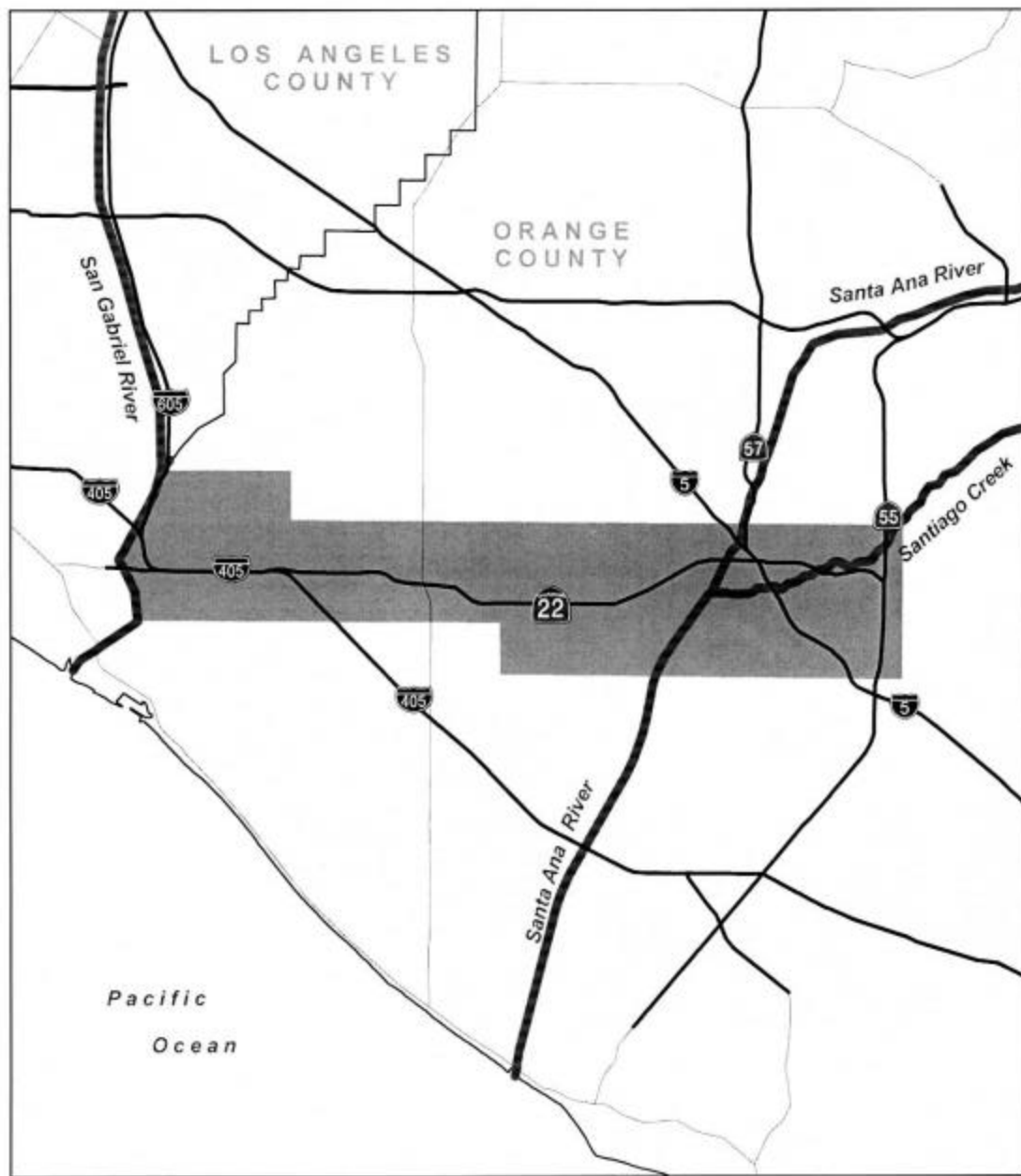
3.2.2 GROUNDWATER

Both natural and artificial factors influence groundwater in Orange County. Natural factors include rainfall, outflow from underground reservoirs to the ocean and other basins, and stream inflow. Due to the urban nature of the study area and the low percentage of pervious surfaces, limited groundwater recharge occurs naturally. The majority of groundwater recharge in the study area occurs by artificial recharge from water within the Santa Ana River north (upstream) of the study area. Artificial factors include water extraction through wells and the recharge of groundwater basins using imported or treated water supplies. However, most of the recharge basins are located north (upstream) of the proposed improvements, and few sites are located downstream.

A. LOCATION

The Orange County groundwater basin underlies the northern half of Orange County, including the study area (see Figure 3.2-2, Major Surface Water Resources, SR-22/WOCC). The entire basin covers approximately 910 square kilometers (350 square miles). It is bordered by the Coyote and Chino Hills to the north, the Santa Ana Mountains to the northeast, the Pacific Ocean to the southwest, and terminates near the Orange County line to the northwest.

The California Department of Water Resources divides the Orange County groundwater basin into two hydrologic divisions, the Forebay Area and the Pressure Area (see Figure 3.2-2). The Forebay Area encompasses much of the cities of Garden Grove (eastern side), Santa Ana, Orange and Tustin. The majority of the central and coastal portions of the basin fall within the Pressure Area, including Garden Grove (western half), Westminster, Seal Beach, Rossmoor and Los Alamitos.



Source: ESRI 1998.

LEGEND

-  Major Highways
-  Major Surface Water Resources
-  Study Area



SR-22 / West Orange County Connection Project **Major Surface Water Resources**

Figure 3.2-1

B. USE

The Santa Ana River is used for groundwater recharge as described in Section 3.2.1 of the August 2001 DEIR/EIS. Beneficial uses for the Lower Santa Ana River Basin groundwater subbasins include municipal and domestic supply, agricultural supply, industrial service supply and industrial process supply.

C. QUALITY

During 1996 and 1997, the Orange County Water District (OCWD) service area had an average of 506 milligrams per liter (0.0805 ounces per gallon) total dissolved solids (TDS). The TDS concentration had an average flow weight of 466 milligrams per liter (0.0741 ounces per gallon) TDS (OCWD, *Engineer's Report*, 1998). Poorer quality water with high organic or mineral content is treated to make it drinkable.

3.2.3 FLOODPLAIN

The Federal Emergency Management Agency (FEMA) *Flood Insurance Study for Orange County, California* has identified 100-year flood limits for nine of the eighteen flood control channels that cross the project alignment (see Table 3.2-1, Orange County Flood Control Facilities).¹ All nine culverts studied by FEMA passing under the study area freeways fully contain the 100-year flows. Detailed floodplain maps at each of the crossings are included in Appendix B of the *Floodplain Evaluation Report* (December 2000).

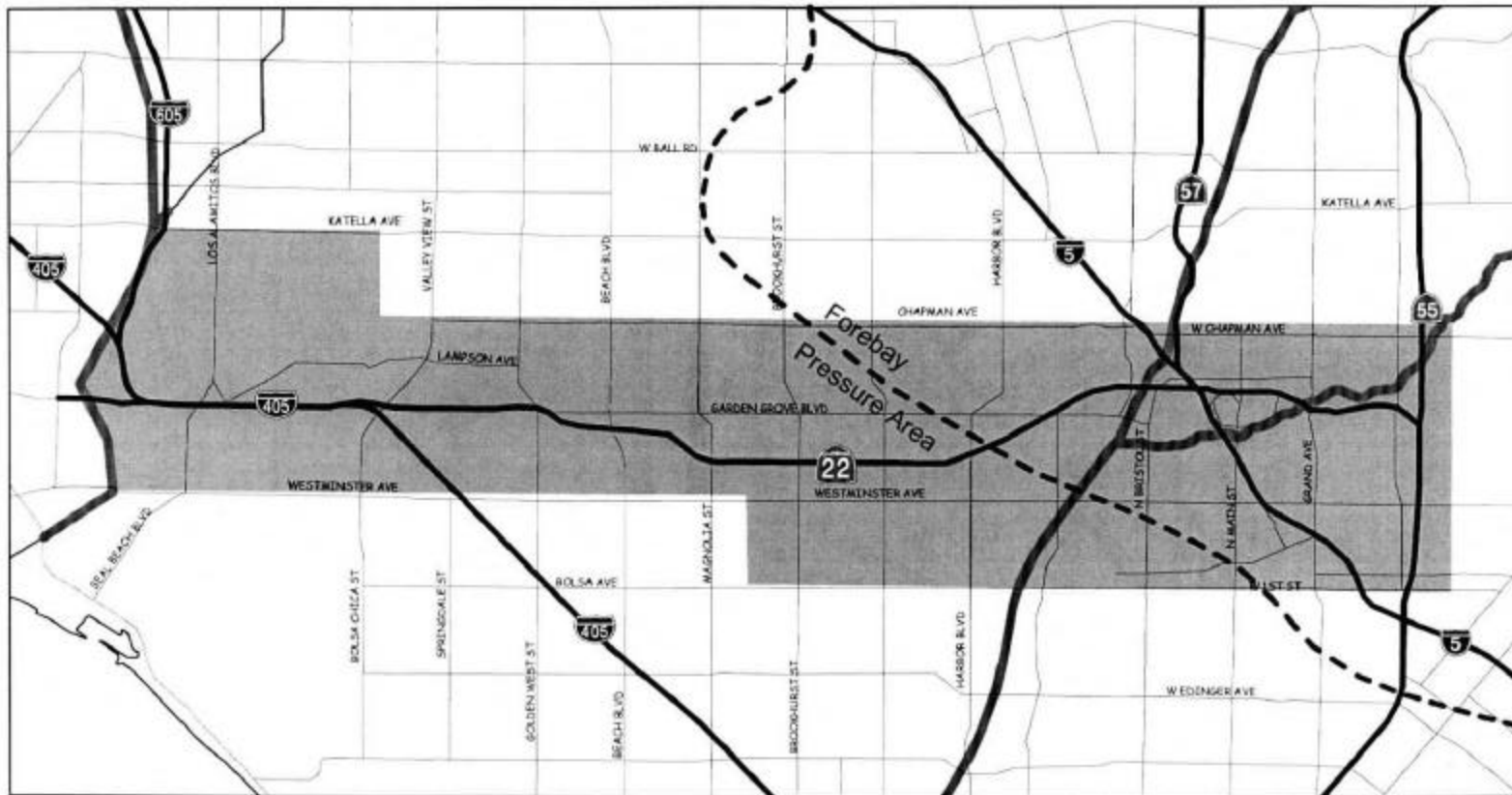
Table 3.2-1
ORANGE COUNTY FLOOD CONTROL FACILITIES

Facility (with Orange County System Number)	Included in FEMA Flood Insurance Study
Los Alamitos Channel (C01)	Yes ^a
Katella Storm Channel (C01S05)	No
Kempton Storm Channel (C01S01)	No
Montecito Storm Channel (C01S03)	Yes ^a
Bixby Storm Channel (C01S04)	Yes ^a
Bolsa Chica Channel (C02)	Yes ^a
Federal Storm Channel (C01S06)	Yes ^a
Anaheim-Barber City Channel (C03)	Yes ^b
Bolsa Grande Storm Channel (C04S02)	No
Westminster Channel (C04)	No
Taft Storm Drain (C04P12)	No
Newhope Channel (C05S10)	No
East Garden Grove-Wintersburg Channel (C05)	Yes ^b
Lewis Storm Channel (C05S10)	No
Santa Ana River (E01)	Yes ^b
La Veta Storm Channel (E08P01)	No
El Modena Storm Channel (E08P06)	No
Santiago Creek (E08)	Yes ^b

^a Approximate methods used for study of floodplain.

^b Detailed methods used for study of floodplain.


¹ This study is available at Caltrans District 12.

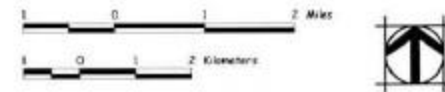


Source: ESRI 1998, Orange County Water District, 1999

Note: Entire study area is underlain by the Orange County groundwater basin.

LEGEND

-  Freeway
-  Forebay/Pressure Area Boundary
-  Study Area



SR-22 / West Orange County Connection Project Groundwater Recharge Basin

Figure 3.2-2

**Table 3.2-2
FLOOD FLOWS, ELEVATIONS AND ZONES**

Facility (with Orange County System Number)	50-Year Flow	100-Year Flow* (multiple sources, see notes)	100-Year Elevation meters (Feet)	Flood Zone^a
Los Alamitos Channel (C01)	Not Available	69 cms (1,950 cfs) ^b	Per FEMA, flow contained in channel, exact flooding elevation not determined	No elevations established, a limit only
Katella Storm Channel (C01S05)	Not Available	220 cms (780 cfs) ^b	Not determined by FEMA or County of Orange PFRD	Not determined by FEMA or County of Orange PFRD
Kempton Storm Channel (C01S01)	Not Available	8.2 cms (290 cfs) ^b	Not determined by FEMA or County of Orange PFRD	Not determined by FEMA or County of Orange PFRD
Montecito Storm Channel (C01S03)	Not Available	18 cms (640 cfs) ^b	Per FEMA, flow contained in channel, exact flooding elevation not determined	No elevations established, a limit only
Bixby Storm Channel (C01S04)	Not Available	5.4 cms (190 cfs) ^b	Per FEMA, flow contained in channel, exact flooding elevation not determined	No elevations established, a limit only
Bolsa Chica Channel (C02)	Not Available	109 cms (3,850 cfs) ^b	Per FEMA, flow contained in channel, exact flooding elevation not determined	No elevations established, a limit only
Federal Storm Channel (C01S06)	Not Available	11 cms (400 cfs) ^b	Per FEMA, flow contained in channel, exact flooding elevation not determined	No elevations established, a limit only
Anaheim-Barber City Channel (C03)	27 cms (950 cfs) ^a	37 cms (1,300 cfs) ^a 178 cms (6,300 cfs) ^b	Per FEMA, flow contained in channel, exact flooding elevation not determined	No elevations established, a limit only
Bolsa Grande Storm Channel (C04S02)	Not Available	Not Available	Not determined by FEMA or County of Orange PFRD	Not determined by FEMA or County of Orange PFRD
Westminster Channel (C04)	Not Available	Not Available	Not determined by FEMA or County of Orange PFRD	Not determined by FEMA or County of Orange PFRD
Taft Storm Drain (C04P12)	Not Available	Not Available	Not determined by FEMA or County of Orange PFRD	Not determined by FEMA or County of Orange PFRD
East Garden Grove- Wintersburg Channel (C05)	24 cms (850 cfs) ^a	34 cms (1,200 cfs) ^a 28 cms (990 cfs) ^b	Per FEMA, flow contained in channel, exact flooding elevation not determined	No elevations established, a limit only
Newhope Channel (C05S10)	Not Available	Not Available	Not determined by FEMA or County of Orange PFRD	Not determined by FEMA or County of Orange PFRD

Table 3.2-2 (continued)
FLOOD FLOWS, ELEVATIONS AND ZONES

Facility (with Orange County System Number)	50-Year Flow	100-Year Flow* (multiple sources, see notes)	100-Year Elevation	Flood Zone^a
Lewis Storm Channel (C05S10)	Not Available	Not Available	Not determined by FEMA or County of Orange PFRD	Not determined by FEMA or County of Orange PFRD
Santa Ana River (E01) (upstream of Santiago Creek)	1,005 cms (35,500 cfs) ^c	1,400 cms (50,000 cfs) ^a 1,190 cms (42,000 cfs) ^b 1,090 cms (38,500 cfs) ^c	32.38 m (100.22 ft) ^a	No Floodplain Zone
Santa Ana River (E01) (downstream of Santiago Creek)	1,048 cms (37,000 cfs) ^c	1,400 cms (50,000 cfs) ^a 1,190 cms (42,000 cfs) ^b 1,160 cms (41,000 cfs) ^c	32.22 m (105.71 ft) ^a	No Floodplain Zone
Santiago Creek (E08) (at SR-22)	113 cms (4,000 cfs) ^a	338 cms (12,000 cfs) ^a 183 cms (6,450 cfs) ^b 127 cms (4,500 cfs) ^c	51 m (168 ft) ^a	No Floodplain Zone
Santiago Creek (E08) (at SR-55)	113 cms (4,000 cfs) ^a	338 cms (12,000 cfs) ^a 183 cms (6,450 cfs) ^b 110 cms (3900 cfs) ^c	71 m (232 ft) ^a	No Floodplain Zone
La Veta Storm Channel (E08P01)	Not Available	Not Available	Not determined by FEMA or County of Orange PFRD	Not determined by FEMA or County of Orange PFRD
El Modena Storm Channel (E08P06)	Not Available	Not Available	Not determined by FEMA or County of Orange PFRD	Not determined by FEMA or County of Orange PFRD

Sources: ^a FEMA, 1997. ^b Orange County, 1999. ^c USACOE, 1988.

Note: * 100-year flows that should govern design are **indicated in bold**
 cms = cubic meters per second; cfs = cubic feet per second

The Flood Insurance Study for Orange County, California defines the 10-, 50-, 100- and 500-year flood flows for four of the nine creeks studied that cross the project alignment. The FEMA-defined 100-year flows, elevations and zones for the four waterways studied are shown in Table 3.2-2, Floodflows, Elevations and Zones. Figure 3.2-3, Flood Control Channels in the SR-22/WOCC, depicts all of the flood control channels.

The Santa Ana River connects to the Pacific Ocean well downstream of SR-22. In many locations, the riverbanks have been stabilized by the placement of rock riprap, and channel capacity has been increased by the construction of levees protected by riprap material. Within the Santa Ana River floodplain, the County of Orange Public Facilities and Resources Department (PFRD) has channelized several major tributary watercourses to convey local runoff, but this has not materially reduced the 100-year flooding of the Santa Ana River. With the completion of the Seven Oaks Dam and lower Santa Ana River channel improvements from Imperial Highway to the Pacific Ocean, part of the Santa Ana River Mainstem Project, the river channel is now capable of containing a 100-year flood, according to the U.S. Army Corps of Engineers letter of September 27, 1999 (see Appendix C). The resulting, greatly increased flood capacity would receive runoff primarily from local storms occurring in the coastal plain of Orange County (Figure 3.2-4, FEMA-Defined Floodplains).

Figure 3.2-3



Source: ESR 1998, FEMA 2000.

LEGEND

- Major Roads
- Primary Creeks/Channels
- FEMA 100-year Floodplains
- FEMA Remaining Zone A99 SFHA



SR-22 / West Orange County Connection Project **FEMA-Defined Floodplains**

Figure 3.2-4